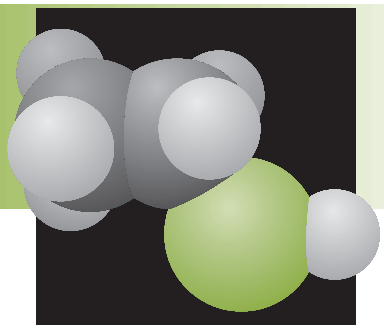
CHEMICALS
Project Fact Sheet



Fractionation of Corn Fiber for Production of Polyols

Benefits

- Energy savings of 87 billion Btu in 2010
- Waste reduction of 1.8 million tons in 2010
- Production cost savings of $681 million in 2010
- Lower cost feedstock for chemical industries
- New higher-value markets for agriculture by-products

Applications

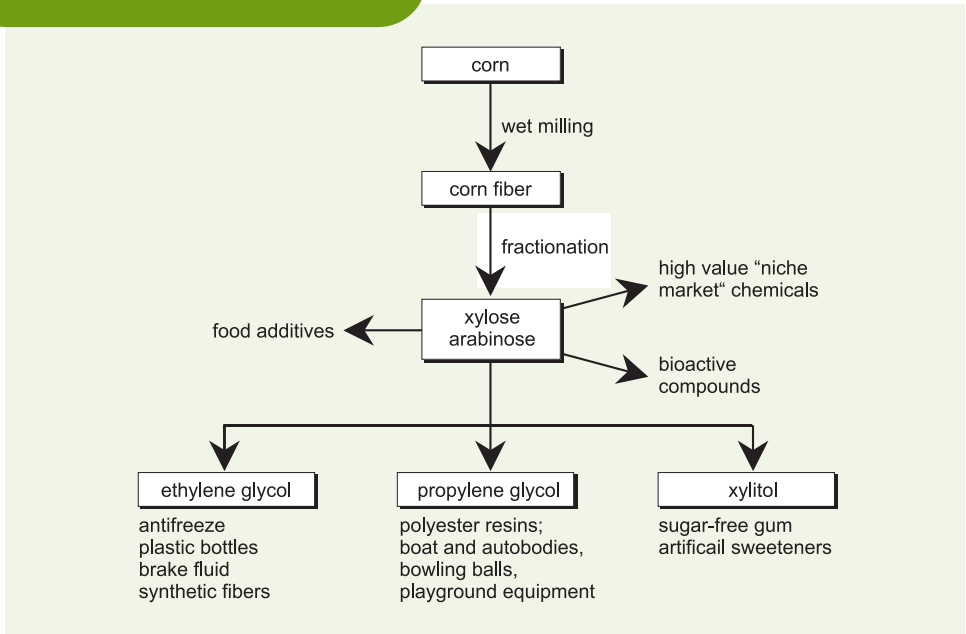
Efficient separation technology could turn a corn wet mill into a low cost producer of ethylene glycol, propylene glycol, and other sugar-derived products for commodity chemical markets.

Chemical industries use ethylene glycol and propylene glycol to produce antifreeze, polyester for plastics used in 2-liter soft drink bottles and fabrics, personal care items such as shaving creams and suntan lotions, liquid laundry detergents, fiberglass reinforced plastics for use in boat hulls, construction pipes, and serving trays, deicers for airplanes, and adhesives.

Corn fiber fractionation will provide low-cost chemical feedstock

For the industrial chemicals industry, corn fiber fractionation promises to be an energy-saving and cost-saving source of polyol feedstock. Corn fiber is an inexpensive and abundant renewable feedstock available as a by-product of the corn milling industry. More than 10 billion pounds of corn fiber—the outer covering of the corn kernel after the wet milling process—is sold as animal feed at $0.03 to 0.04 per pound, an extremely low-value use for the material. Innovative new technology is being developed to cleanly and selectively remove hemicellulose from the corn fiber and to subsequently separate and isolate the xylose and arabinose fraction. Hemicellulose makes up 60 to 70 percent of the weight of corn fiber, and xylose and arabinose make up about 60 to 70 percent of the weight of the hemicellulose. Catalytic conversion of xylose and arabinose into ethylene and propylene glycol (polyols) would produce a valuable feedstock with a very large market and a variety of applications (4.3 billion per pound of ethylene glycol and 0.8 billion per pound of propylene glycol are produced each year). The cost of xylose and arabinose would be very competitive—about $0.03 to 0.05 per pound.

Corn Fractionation Process



Corn fiber fractionation process produces low-cost feedstock for chemical industries.

Project Description

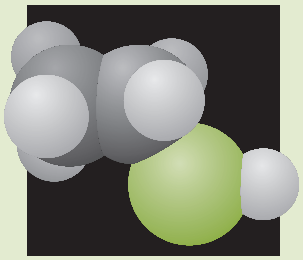
Goal: Demonstrate the use of corn fiber as a feedstock for ethylene and propylene glycol production.

Corn fiber fractionation research will focus on separating five carbon sugars from other material in corn fiber using novel separation technology. Selectivity and yield will be optimized to make corn fiber an economically viable feedstock.

Process optimization will develop conditions for fractionation at high concentrations, and sugar isolation from dilute aqueous solutions. After mass closure and reagent/solvent recovery studies, the process will be demonstrated at a corn wet mill. During scale-up and industrial performance verification, work will focus on the design, setup and operation of an integrated, large scale separation/catalytic conversion process for the manufacture of ethylene and propylene glycol.

Progress and Milestones

- Demonstrated a laboratory scale separation of a xylose- and arabinose-containing fraction of corn fiber. The process requires optimization to increase purity.
- In progress is a complete and selective fractionation of xylose and arabinose from corn fiber. The next step will be to scale-up the process with a major corn wet miller and demonstrate the fractionation process on an industrial scale.
- A parallel project is underway to develop and test new catalytic methods for the conversion of inexpensive xylose and arabinose into ethylene and propylene glycol.
- Commercialization will be completed by the corn wet milling industry.



Project Partners

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